

CLAIMS:

1. An apparatus suitable for use in identifying a noise component originating from a certain source of noise in a DSP-based mixed-signal system, said apparatus comprising:
 - 5 a. a processing unit operative for:
 - i. receiving a first signal released by a first signal path, the first signal path including a digital-to-analog converter and a first analog-to-digital converter;
 - ii. receiving a second signal released by a second signal path, the second signal path including the digital-to-analog converter and a second analog-to-digital
10 converter;
 - iii. processing the first signal and the second signal to derive a noise component associated to a certain source of noise, the certain source of noise being a selected one of the digital-to-analog converter, the first analog-to-digital converter and the second analog-to-digital converter, said processing
15 including:
 1. processing said first signal to derive a first frequency domain signal;
 2. processing the first frequency domain signal to derive a first noise component associated with the first signal;
 3. processing said second signal to derive a second frequency domain
20 signal;
 4. processing the second frequency domain signal to derive a second noise component associated with the second signal;
 5. processing the first frequency domain signal and the second frequency domain signal to derive a third noise component, the third noise component being indicative of the noise component associated with the
25 certain source of noise;
 - b. an output for releasing a signal indicative of the noise component associated to the certain source of noise.

2. An apparatus as defined in claim 1, wherein said processing unit is adapted for:
 - i. applying a subtraction operation on the first frequency domain signal and the second frequency domain signal to derive a difference signal;
 - ii. processing the difference signal to derive the third noise component.
- 5 3. An apparatus as defined in claim 1, wherein the noise component associated to the certain source of noise is indicative of an average noise power of the certain source of noise.
- 10 4. An apparatus as defined in claim 1, wherein the noise component associated to the certain source of noise includes either one of:
 - a. jitter induced noise;
 - b. thermal induced noise;
 - c. quantization noise; or
 - 15 d. a combination of at least two of jitter induced noise, thermal induced noise and quantization noise.
5. An apparatus as defined in claim 1, wherein the noise component associated to the certain source of noise excludes jitter induced noise.
- 20 6. An apparatus as defined in claim 1, wherein:
 - a. the first noise component is indicative of an average noise power associated with the first signal; and
 - 25 b. the second noise component is indicative of an average noise power associated with the second signal.
7. An apparatus as defined in claim 6, wherein the third noise component is indicative of an average noise power associated to a difference between a signal derived from the first signal and a signal derived from a second signal.
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8. An apparatus as defined in claim 1, wherein said processing unit is adapted for:
 - a. applying a fast fourrier transform (FFT) on said first signal to derive the first frequency domain signal;
 - 5 b. applying a fast fourrier transform (FFT) on said second signal to derive the second frequency domain signal.
9. An apparatus as defined in claim 1, wherein said processing unit is further operative for
10 processing the noise component associated to the certain source of noise on the basis of a signal applied to the first signal path and the second signal path to derived a transmission parameter data element.
10. An apparatus as defined in claim 9, wherein the transmission parameter data element is
15 selected from the set consisting of a signal-to-noise ratio (SNR), a signal-to-noise-and-distortion ratio (SNDR or SINAD), a total-harmonic distortion (THD) and spurious free dynamic range (SFDR).
11. A method for identifying a noise component originating from a certain source of noise
20 in a DSP-based mixed-signal system, said method comprising:
 - a. receiving a first signal released by a first signal path, the first signal path including a digital-to-analog converter and a first analog-to-digital converter;
 - b. receiving a second signal released by a second signal path, the second signal path including the digital-to-analog converter and a second analog-to-digital converter;
 - 25 c. processing the first signal to derive a first frequency domain signal;
 - d. processing the first frequency domain signal to derive a first noise component associated with the first signal;
 - e. processing the second signal to derive a second frequency domain signal;
 - f. processing the second frequency domain signal to derive a second noise
30 component associated with the second signal;

- g. processing the first frequency domain signal and the second frequency domain signal to derive a third noise component, the third noise component being indicative of a noise component associated with a certain source of noise, the certain source of noise being a selected one of the digital-to-analog converter, the first analog-to-digital converter and the second analog-to-digital converter;
- h. releasing a signal indicative of the noise component associated to the certain source of noise.

12. A method as defined in claim 11, wherein said method comprises:
- i. applying a subtraction operation on the first frequency domain signal and the second frequency domain signal to derive a difference signal;
 - ii. processing the difference signal to derive the third noise component.

13. A method as defined in claim 11, wherein the noise component associated to the certain source of noise is indicative of an average noise power of the certain source of noise.

14. A method as defined in claim 11, wherein the noise component associated to the certain source of noise includes either one of:
- a. jitter induced noise;
 - b. thermal induced noise;
 - c. quantization noise; or
 - d. a combination of at least two of jitter induced noise, thermal induced noise and quantization noise.

15. A method as defined in claim 11, wherein the noise component associated to the certain source of noise excludes jitter induced noise.

16. A method as defined in claim 11, wherein:
- a. the first noise component is indicative of an average noise power associated with the first signal; and

- b. the second noise component is indicative of an average noise power associated with the second signal.

17. A method as defined in claim 16, wherein the third noise component is indicative of an
5 average noise power associated to a difference between a signal derived from the first
signal and a signal derived from a second signal.

18. A method as defined in claim 16, wherein said method comprises:
- a. applying a fast fourrier transform (FFT) on said first signal to derive the first
10 frequency domain signal;
 - b. applying a fast fourrier transform (FFT) on said second signal to derive the second
frequency domain signal.

19. A method as defined in claim 11, wherein said method comprises processing the noise
15 component associated to the certain source of noise on the basis of a signal applied to
the first signal path and the second signal path to derived a transmission parameter data
element.

20. A method as defined in claim 19, wherein the transmission parameter data element is
20 selected from the set consisting of a signal-to-noise ratio (SNR), a signal-to-noise-and-
distortion ratio (SNDR or SINAD), a total-harmonic distortion (THD) and spurious free
dynamic range (SFDR).

21. A computer readable storage medium including a program element suitable for
25 execution by a computing apparatus for identifying a noise component originating from
a certain source of noise in a DSP-based mixed-signal system, said computer apparatus
comprising:
- a. a memory unit;
 - b. a processing operatively coupled to said memory unit, said program element when
30 executing on said processor being operative for:

- i. receiving a first signal released by a first signal path, the first signal path including a digital-to-analog converter and a first analog-to-digital converter;
- ii. receiving a second signal released by a second signal path, the second signal path including the digital-to-analog converter and a second analog-to-digital converter;
- 5 iii. processing the first signal to derive a first frequency domain signal;
- iv. processing the first frequency domain signal to derive a first noise component associated with the first signal;
- v. processing the second signal to derive a second frequency domain signal;
- 10 vi. processing the second frequency domain signal to derive a second noise component associated with the second signal;
- vii. processing the first frequency domain signal and the second frequency domain signal to derive a third noise component, the third noise component being indicative of a noise component associated with a certain source of noise, the certain source of noise being a selected one of the digital-to-analog converter, the first analog-to-digital converter and the second analog-to-digital converter;
- 15 viii. releasing a signal indicative of the noise component associated to the certain source of noise.

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22. A computer readable storage medium as defined in claim 21, wherein said program element when executing on said processor is operative for:

- i. applying a subtraction operation on the first frequency domain signal and the second frequency domain signal to derive a difference signal;
- 25 ii. processing the difference signal to derive the third noise component.

23. A computer readable storage medium as defined in claim 21, wherein the noise component associated to the certain source of noise is indicative of an average noise power of the certain source of noise.

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24. A computer readable storage medium as defined in claim 21, wherein the noise component associated to the certain source of noise includes either one of:
- a. jitter induced noise;
 - b. thermal induced noise;
 - 5 c. quantization noise; or
 - d. a combination of at least two of jitter induced noise, thermal induced noise and quantization noise.
25. An apparatus as defined in claim 21, wherein the noise component associated to the
10 certain source of noise excludes jitter induced noise.
26. A computer readable storage medium as defined in claim 21, wherein:
- a. the first noise component is indicative of an average noise power associated with
15 the first signal; and
 - b. the second noise component is indicative of an average noise power associated with the second signal.
27. A computer readable storage medium as defined in claim 26, wherein the third noise
20 component is indicative of an average noise power associated to a difference between a signal derived from the first signal and a signal derived from a second signal.
28. A computer readable storage medium as defined in claim 26, wherein said program element when executing on said processor being operative for:
- 25 a. applying a fast fourrier transform (FFT) on said first signal to derive the first frequency domain signal;
 - b. applying a fast fourrier transform (FFT) on said second signal to derive the second frequency domain signal.

29. A computer readable storage medium as defined in claim 21, wherein said program element when executing on said processor being operative for processing the noise component associated to the certain source of noise on the basis of a signal applied to the first signal path and the second signal path to derived a transmission parameter data
5 element.
30. A computer readable medium as defined in claim 29, wherein the transmission parameter data element is selected from the set consisting of a signal-to-noise ratio (SNR), a signal-to-noise-and-distortion ratio (SNDR or SINAD), a total-harmonic
10 distortion (THD) and spurious free dynamic range (SFDR).
31. A system suitable use in identifying a noise component originating from a source of noise in a DSP-based mixed-signal system, said system comprising:
- a. a test module including:
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 - i. an input suitable for receiving a test signal;
 - ii. a first output suitable for releasing a first signal;
 - iii. a second output for releasing a second signal;
 - iv. a first signal path between said input and said first output including a digital-to-analog converter and a first analog-to-digital converter;
 - 20 v. a second signal path between said input and said second output including the digital-to-analog converter and a second analog-to-digital converter;
 - b. a processing unit adapted for receiving the first signal and the second signal, said processing unit being operative for:
 - i. processing the first signal to derive a first frequency domain signal;
 - 25 ii. processing the first frequency domain signal to derive a first noise component associated with the first signal;
 - iii. processing the second signal to derive a second frequency domain signal;
 - iv. processing the second frequency domain signal to derive a second noise component associated with the second signal;

- v. processing the first frequency domain signal and the second frequency domain signal to derive a third noise component, the third noise component being indicative of a noise component associated with a certain source of noise, the certain source of noise being a selected one of the digital-to-analog converter, the first analog-to-digital converter and the second analog-to-digital converter;
- c. an output for releasing the noise component associated to the certain source of noise.

10 32. A system as defined in claim 31, wherein said processing unit is operative for:

- i. applying a subtraction operation on the first frequency domain signal and the second frequency domain signal to derive a difference signal;
- ii. processing the difference signal to derive the third noise component.

15 33. A system as defined in claim 31, wherein the noise component associated to the certain source of noise is indicative of an average noise power of the certain source of noise.

34. A system as defined in claim 31, wherein the noise component associated to the certain source of noise includes either one of:

- 20 a. jitter induced noise;
- b. thermal induced noise;
- c. quantization noise; or
- d. a combination of at least two of jitter induced noise, thermal induced noise and quantization noise.

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35. A system as defined in claim 31, wherein the noise component associated to the certain source of noise excludes jitter induced noise.

36. A system as defined in claim 31, wherein:

- a. the first noise component is indicative of an average noise power associated with the first signal; and
- b. the second noise component is indicative of an average noise power associated with the second signal.

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37. A system as defined in claim 36, wherein the third noise component is indicative of an average noise power associated to a difference between the first signal and the second signal.

10 38. A system as defined in claim 36, wherein said processing unit is adapted for:

- a. applying a fast fourrier transform (FFT) on said first signal to the first frequency domain signal;
- b. applying a fast fourrier transform (FFT) on said second signal to derive the second frequency domain signal.

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39. A system as defined in claim 31, wherein said processing unit is further operative for processing the noise component associated to the certain source of noise on the basis of the test signal received at the input of said test module to derived a transmission parameter data element.

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40. A system as defined in claim 39, wherein the transmission parameter data element is selected from the set consisting of a signal-to-noise ratio (SNR), a signal-to-noise-and-distortion ratio (SNDR or SINAD), a total-harmonic distortion (THD) and spurious free dynamic range (SFDR).

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41. An apparatus suitable for use in deriving a transmission parameter associated to a device in a DSP-based mixed-signal system, said apparatus comprising:

- a. a processing unit operative for:
 - i. receiving a first signal released by a first signal path, the first signal path including a digital-to-analog converter and a first analog-to-digital converter;

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- ii. receiving a second signal released by a second signal path, the second signal path including the digital-to-analog converter and a second analog-to-digital converter;
- iii. receiving a third signal derived from a test signal applied to the first signal path and to the second signal path;
- iv. processing the first signal to derive a first frequency domain signal;
- v. processing the first frequency domain signal to derive a first noise component associated with the first signal;
- vi. processing the second signal to derive a second frequency domain signal;
- vii. processing the second frequency domain signal to derive a second noise component associated with the second signal;
- viii. processing the first frequency domain signal and the second frequency domain signal to derive a third noise component, the third noise component being indicative of a noise component associated with a certain source of noise, the certain source of noise being a selected one of the digital-to-analog converter, the first analog-to-digital converter and the second analog-to-digital converter;
- ix. deriving a transmission parameter data element associated to the certain device at least in part on the basis of the noise component associated to the certain device and the third signal;
- b. an output for releasing a signal indicative of the transmission parameter data element associated to a certain device.

42. An apparatus as defined in claim 41, wherein said processing unit is adapted for:

- i. applying a subtraction operation on the first frequency domain signal and the second frequency domain signal to derive a difference signal;
- ii. processing the difference signal to derive the third noise component.

43. An apparatus as defined in claim 41, wherein the transmission parameter data element is selected from the set consisting of a signal-to-noise ratio (SNR), a signal-to-noise-and-

distortion ratio (SNDR or SINAD), a total-harmonic distortion (THD) and spurious free dynamic range (SFDR).

44. An apparatus as defined in claim 41, wherein the noise component associated to the
5 certain source of noise is indicative of an average noise power of the certain source of noise.

45. An apparatus as defined in claim 41, wherein the noise component associated to the certain source of noise includes either one of:

- 10 a. jitter induced noise;
b. thermal induced noise;
c. quantization noise; or
d. a combination of at least two of jitter induced noise, thermal induced noise and quantization noise.

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46. An apparatus as defined in claim 41, wherein the noise component associated to the certain source of noise excludes jitter induced noise.

47. An apparatus as defined in claim 41, wherein:

- 20 a. the first noise component is indicative of an average noise power associated with the first signal; and
b. the second noise component is indicative of an average noise power associated with the second signal.

25 48. An apparatus as defined in claim 47, wherein the third noise component is indicative of an average noise power associated to a difference between a signal derived from the first signal and a signal derived from a second signal.

49. An apparatus as defined in claim 47, said processing unit being adapted for:

- a. applying a fast fourrier transform (FFT) on said first signal to derive the first frequency domain signal;
- b. applying a fast fourrier transform (FFT) on said second signal to the second frequency domain signal.

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50. An apparatus suitable for use in identifying a noise component originating from a device-under-test in a DSP-based mixed-signal system, said apparatus comprising:

- a. a processing unit operative for:
 - i. receiving a first signal released by a first signal path, the first signal path including a digital-to-analog converter and a first analog-to-digital converter;
 - 10 ii. receiving a second signal released by a second signal path, the second signal path including the digital-to-analog converter and a second analog-to-digital converter;
 - 15 iii. receiving a third signal released by a third signal path, the third signal path including the digital-to-analog converter and a device-under-test;
 - iv. processing the first signal, the second signal and the third signal to derive a noise component associated to the device-under-test;
- b. an output for releasing a signal indicative of the noise component associated to the device-under-test.

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51. An apparatus as defined in claim 50, wherein the device-under-test is a third analog-to-digital converter.

52. A system suitable use in identifying a noise component originating from a device under test in a DSP-based mixed-signal system, said system comprising:

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- a. a test module including:
 - i. an input suitable for receiving a test signal;
 - ii. a first output suitable for releasing a first signal;
 - iii. a second output for releasing a second signal;
 - 30 iv. a third output for releasing a third signal;

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- v. a first signal path between said input and said first output including a digital-to-analog converter and a first analog-to-digital converter;
 - vi. a second signal path between said input and said second output including the digital-to-analog converter and a second analog-to-digital converter;
 - 5 vii. a third signal path between said input and said third output including the digital-to-analog converter and a device-under-test;
 - b. a processing unit adapted for processing the first signal, the second signal and the third signal to derive a noise component associated to the device-under-test;
 - c. an output for releasing the noise component associated to the device-under-test.
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53. A system as defined in claim 52, wherein the device-under-test is a third analog-to-digital converter.
54. An apparatus suitable for use in identifying a noise component originating from a
- 15 certain source of noise in a DSP-based mixed-signal system, said apparatus comprising:
- a. a processing unit operative for:
 - i. receiving a first signal released by a first signal path, the first signal path including a primary component and a secondary component;
 - ii. receiving a second signal released by a second signal path, the second signal
 - 20 path including the primary component and a third component distinct from the secondary component;
 - iii. processing said first signal to derive a first frequency domain signal;
 - iv. processing the first frequency domain signal to derive a first noise component associated with the first signal;
 - 25 v. processing said second signal to derive a second frequency domain signal;
 - vi. processing the second frequency domain signal to derive a second noise component associated with the second signal;
 - vii. processing the first frequency domain signal and the second frequency domain signal to derive a third noise component, the third noise component
 - 30 being indicative of a noise component associated with a certain source of

noise, the certain source of noise being a selected one of the primary component, the secondary component and the third component;

- b. an output for releasing a signal indicative of the noise component associated to the certain source of noise.

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55. An apparatus as defined in claim 54, wherein the primary component is a digital-to-analog converter and the secondary component is a first analog-to-digital converter and the third component is a second analog-to-digital converter.

10 56. An apparatus as defined in claim 54, wherein the primary component is an analog-to-digital converter and the second component is a first digital-to-analog converter and the third component is a second digital-to-analog converter.

15 57. An apparatus suitable for use in identifying a noise component originating from a certain source of noise in a DSP-based mixed-signal system, said apparatus comprising:

- a. means for receiving a first signal released by a first signal path, the first signal path including a digital-to-analog converter and a first analog-to-digital converter;
- b. means for receiving a second signal released by a second signal path, the second signal path including the digital-to-analog converter and a second analog-to-digital converter;
- 20 c. means for processing said first signal to derive a first frequency domain signal;
- d. means for processing the first frequency domain signal to derive a first noise component associated with the first signal;
- e. means for processing said second signal to derive a second frequency domain signal;
- 25 f. means for processing the second frequency domain signal to derive a second noise component associated with the second signal;
- g. means for processing the first frequency domain signal and the second frequency domain signal to derive a third noise component, the third noise component being
- 30 indicative of a noise component associated with a certain source of noise, the

certain source of noise being a selected one of the digital-to-analog converter, the first analog-to-digital converter and the second analog-to-digital converter;

- h. means for releasing a signal indicative of the noise component associated to the certain source of noise.